

**REMARKS**

Applicants respectfully request favorable reconsideration of this application, as amended.

Claims 1-3, 5, 7-14, and 18-20 were rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over “Aluminum and Aluminum Alloys” pages 220, 297, 718-719, and 722. Applicants respectfully traverse.

Regarding Claims 1-3, 5, 7-14 and 18-20, Applicants respectfully maintain the position and arguments provided in the previous responses filed December 27, 2007, August 28, 2008, and May 13, 2009, which are not repeated herein in the interests of brevity and efficiency, but that are herein incorporated by reference.

Claims 21-23 were rejected under 35 U.S.C. § 103(a) as being unpatentable over “Aluminum and Aluminum Alloys” pages 220, 297, 718-719, and 722.

Without acceding to the outstanding rejections, Claims 22 and 23 have been amended to recite, *inter alia*, an average dendrite arm spacing of between 10 and 40 micrometers ( $\mu\text{m}$ ). Newly added Claim 24 recites, *inter alia*, a solidification rate that is sufficient to produce an average dendrite arm spacing of between 10 and 40  $\mu\text{m}$ .

The above amendments more specifically define the dendrite arm spacing for the as-cast claimed product and the corresponding solidification rate for casting the product. This is important because it reinforces Applicants’ previous submissions that the subject invention should be regarded as a unique selection among a wide range of compositions, solidification rates, dendrite arm spacings (which are a consequence of solidification rates), and solution treatments. An appropriate selection of alloy composition, solidification rate, and solution treatment is necessary in order to ultimately transform the  $\pi$  phase to the  $\beta$  phase in the claimed alloy.

Regarding independent Claim 21, the Office asserts that the applied reference (i.e., the cited "Aluminum and Aluminum Alloys" handbook) teaches solution heat treatment at 540°C for 4-12 hours and therefore meets the instant claim limitation (see Office Action page 5). Applicants' respectfully note, however, that Claim 21 as previously amended recites, *inter alia*, solution heat treating the casting for 2 to 3.9 hours. The applied reference therefore fails to teach or suggest the method as recited in Claim 21.

Accordingly, Applicants' claimed invention distinguishes patentably over the applied reference. The rejection under 35 U.S.C. § 103(a) should be withdrawn.

Independent Claim 24 has been added to provide more comprehensive protection for Applicants' invention and is also believed to distinguish patentably over the applied reference. Note, for example, the recitation in Claim 24 that: (1) solidifying the casting produces iron-containing phases that include a substantial proportion of  $\pi$  phase, and (2) the solution heat treatment is effective to convert a majority of the  $\pi$  phase to  $\beta$  phase to give a microstructure in the alloy article that includes iron-containing phases which are predominantly  $\beta$  phase. Applicants believe that the applied reference fails to disclose, teach, or suggest these claim limitations, which are important in terms of using Applicants' claimed method to manufacture articles that have the recited microstructure of Applicants' claimed invention.

This can be seen, for example, by considering Figure 44 on page 220 of the cited handbook. Figure 44 shows mechanical properties (yield stress and elongation) versus dendrite cell size (or DAS) for samples of an A356 alloy that were solution heat treated in a T62 treatment. Figure 44 shows four samples having a DAS near 25 micrometers and two samples having a DAS near 38 micrometers, i.e., approximating the solidification rate range as recited in Claim 24, for example. However, the handbook does not disclose

the specific A356 alloy, and it is quite possible that the Mg concentration does not fall within the claimed range of 0.40-0.45 wt.%. In addition, there is no disclosure of the specific T62 treatment. This is significant given the range of temperatures and times that are classified as a T62 treatment. Hence, there is considerable uncertainty about what would be the microstructure — particularly the iron-containing phases in the microstructure — of the samples tested for Figure 44. This uncertainty increases significantly in view of the above-recited limitations of Claim 24. These limitations cannot be viewed simply in terms of the solidification rate for the first limitation and the solution heat treatment for the second limitation. Microstructure, including the iron-containing phases in the microstructure, is also dependent on the composition of the alloy. This point is made clear, for example, in relation to the solution heat treatment step in the paragraph commencing on page 8, line 5 of Applicants' specification. Composition is also more important where a narrow composition range is claimed. Therefore, in order to comply with the first limitation it is necessary to consider together the solidification rate and alloy composition. In addition, in order to comply with the second limitation it is necessary to consider together the solution heat treatment conditions and alloy composition. As a consequence, the recitation provided by Claim 24 should not be considered as separate, self-contained method steps but as a sequence of inter-related steps in the sense that it is necessary to consider, by way of example, (a) the impact of composition on the steps, (b) the selection of solidification rate, and (c) the impact the microstructure produced on solidification has on the selection of the heat treatment conditions. Accordingly, the level of selection required to comply with the limitations of the method recited in Claim 24 would not be obvious to one of ordinary skill in the art, in view of the information provided in the cited handbook. Such an inventive selection could only be made with the benefit of hindsight in view of Applicants' disclosure.

Therefore, the applied reference is not understood as teaching or suggesting Applicant's method, at least as recited in Claim 24. Accordingly, Claim 24 is believed to be allowable. Newly added Claim 25 depends from Claim 24 and is believed to be allowable at least for the reasons discussed above with respect to Claims 21 and 24.


In view of the foregoing amendments and remarks, Applicants believe that the currently pending claims are allowable and respectfully request that the Examiner issue a Notice of Allowance.

Should the Examiner believe that any further action is necessary to place this application in better form for allowance, the Examiner is invited to contact Applicants' representative at the telephone number listed below.

The Commissioner is hereby authorized to charge to Deposit Account No. 50-1165 (T2211-906224) any fees under 37 C.F.R. §§ 1.16 and 1.17 that may be required by this paper and to credit any overpayment to that Account. If any extension of time is required in connection with the filing of this paper and has not been separately requested, such extension is hereby requested.

Respectfully submitted,

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